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Equity in green infrastructure: A case study in Tucson, AZ

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Udall Center for Studies in Public Policy & School of Geography & Development

Congreso Agua-Andes

Ayacucho, Peru

September 19 – 21, 2017



Coupled Networks in Urbanized Landscapes: Linking Ecosystem Services and Governance for Water Sustainability Project

University of Arizona
2015-2020

Sustainable Water for Arid Communities

Building bridges between natural & human systems for a sustainable water future

[ABOUT](#)[PEOPLE](#)[RESEARCH](#)[PARTNER WITH US](#)[STUDENT OPPORTUNITIES](#)[NEWS AND MEDIA](#)[EVENTS](#)

OUR TEAM

Natural and Human
Scientists and Partners

OUR RESEARCH

Where, How, and What We
Study

UWIN PROJECT

Urban Water Innovation
Network

OUR IMPACT

Featured Stories in the
Public Spotlight

We are a group of researchers interested in understanding how previously under-utilized water resources can assist arid communities in achieving a sustainable water resources pathway to the future. These previously under-utilized water sources include: stormwater, rain water, grey water and HVAC condensate among others. The group also understands that a sustainable path to water in arid communities includes efficient water use and the matching of available water to outdoor landscapes appropriate to the climate. The group is made up of social and natural scientists focused on understanding the coupled hydrology, water quality, vegetation response, policies, psychology, and social systems that create the observed behavior of efficient, sustainable water use in arid communities.

Benefits of green infrastructure

GI plays a critical role to provide the ecosystem services that support livable, resilient and sustainable cities, including:

- Shade
- Flood control
- Local food production
- Improved air quality
- Improved aesthetics
- Increased recreational opportunities
- Enhanced social interaction
- Reduced stress, noise, and overcrowding



Santa Cruz River Park

Equity in green infrastructure

- Green infrastructure tends to be situated along access gradients based upon income, race, and ethnicity
- The absence of green infrastructure in low-income, marginalized communities serves to put already stressed communities at an even greater risk
- Inequities in access to green infrastructure





Green Infrastructure

- [Green Infrastructure Home](#)
- [Build Green Infrastructure](#)
- [Learn about Green Infrastructure](#)
- [Collaborate with Green Infrastructure Partners](#)

Build Resiliency to Drought

Fragile local water supplies are being stressed by decreased precipitation associated with climate change in some areas of the country. When a storm event does occur, rain falling on roofs, parking lots, streets, and other hard surfaces runs directly into city storm drains or water bodies. Communities are losing valuable water that could be used or stored for use when it is needed most.

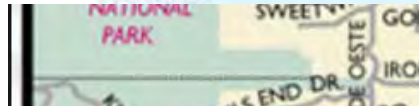


On this page:

- [How To](#)
- [Resources](#)
- [References](#)

This page contains technical information and references for state and local government officials working in the field of stormwater management.

How To



Building Sustainable Communities with Green Infrastructure



GREEN
RESERVE

The American Recovery and Reinvestment Act (ARRA), Green Project Reserve of 2009, through the State Revolving Fund, provided funding for a wide variety of qualifying projects in the categories of: *green infrastructure, energy efficiency, water efficiency, and other innovative projects.*

Green Infrastructure in Arid and Semi-Arid Climates



Adapting innovative stormwater management techniques to the water-limited West.



Rooftops to Rivers II:

Green strategies for controlling stormwater and combined sewer overflows



UPDATE October 2013



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"Emerald Cities," listed darkest to lightest by the number of key green infrastructure actions taken

| City | Long-term green infrastructure (GI) plan | Retention standard | Requirement to use GI to reduce some portion of the existing impervious surfaces | Incentives for private-party actions | Guidance or other affirmative assistance to accomplish GI within city | Dedicated funding source for GI |
|---------------------------|--|--------------------|--|--------------------------------------|---|---------------------------------|
| Philadelphia, PA | ★ | ★ | ★ | ★ | ★ | ★ |
| Milwaukee, WI | ★ | ★ | ★ | ★ | ★ | ★ |
| New York, NY | ★ | | ★ | ★ | ★ | ★ |
| Portland, OR | | ★ | ★ | ★ | ★ | ★ |
| Syracuse, NY | ★ | | ★ | ★ | ★ | ★ |
| Washington, D.C. | | ★ | ★ | ★ | ★ | ★ |
| Aurora, IL | ★ | ★ | | | ★ | ★ |
| Toronto, Ontario, Canada | ★ | ★ | | ★ | ★ | |
| Chicago, IL | | ★ | | ★ | ★ | |
| Kansas City, MO | | | | ★ | ★ | ★ |
| Nashville, TN | ★ | | | | ★ | ★ |
| Seattle, WA | | | | ★ | ★ | ★ |
| Tucson, AZ | | ★ | | ★ | | |
| Pittsburgh, PA | | ★ | | | ★ | |
| Rouge River Watershed, MI | | | | | ★ | |

Dunbar Springs neighborhood

Green infrastructure in Tucson, Arizona is the result of neighborhood action



Tour Gratis del Laboratorio Viviente y Centro de Aprendizaje

Aprenda sobre todos los sistemas de cosecha de agua de lluvia a detalle y lo que puede hacer en su propia casa.

Sábado, 23 de Septiembre, 8:00-9:30 a.m.

Registrese aqui!



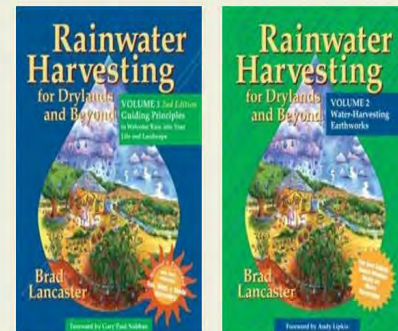
Green infrastructure in Tucson, Arizona is the result of leaders and local groups



Rainwater Harvesting for Drylands and Beyond by Brad Lancaster

- Home
- Store
- Events
- Offerings
- Images, Video & Audio
- Rainwater Harvesting
- Street-Runoff Harvesting
- Greywater Harvesting
- Condensate Harvesting
- Wind & Snow Harvesting
- Sun & Shade Harvesting
- Water-Energy-Carbon Nexus
- One-Page Place Assessments
- Plant Lists & Resources
- About
- Drops in a Bucket Blog
- Living Big by Living Small
- Storytelling
- FAQs

The Best-Selling, Award-Winning Books on Harvesting Water — and More



[Click here to order](#)

Turn water scarcity into water abundance! These books show you how to conceptualize, design, and implement sustainable water-, sun-, wind-, and shade-harvesting systems for your home, landscape, and community. They enable you to access your on-site resources (rainwater, greywater, topsoil, sun, plants, and more), give you a diverse array of strategies to maximize their potential, and empower you with guiding principles to create an integrated, multi-functional resource-harvesting and -enhancing landscape plan specific to your site and needs. These books will help bring your site to life, reduce your cost of living, endow yourself and your community with skills of self-reliance and cooperation, generate renewable on-site power, and create living air conditioners of vegetation that grow beauty, food, flood-control, and



Drops in a Bucket Blog

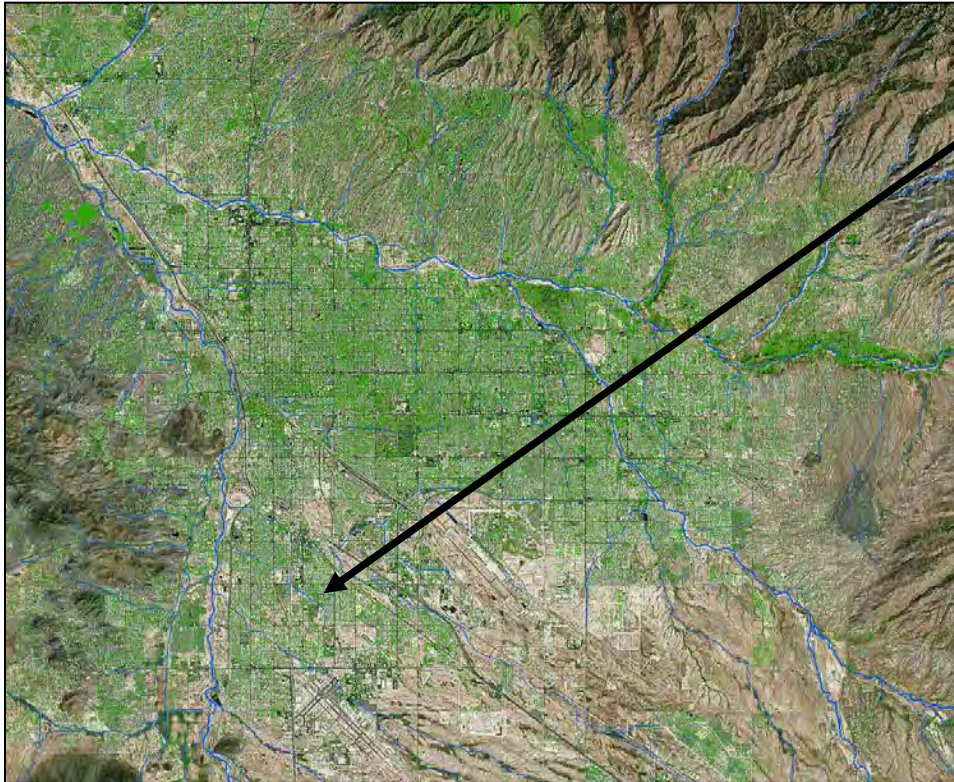
Bandsar Agriculture: Indigenous Runoff-Harvesting & Climate-Change Resilience from Iranian Drylands

Important Elevation and Slope Relationships of Eddy or Backwater Basins

[» Read all blog posts...](#)

Inequities in green infrastructure in Tucson, Arizona

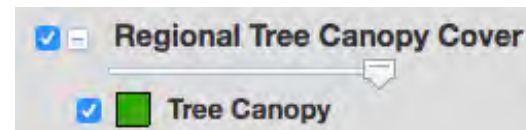
- Although Tucson is considered a leader in green infrastructure, there are considerable equity issues



Tree canopy in Tucson, AZ (data from Pima Association of Governments, PAG)



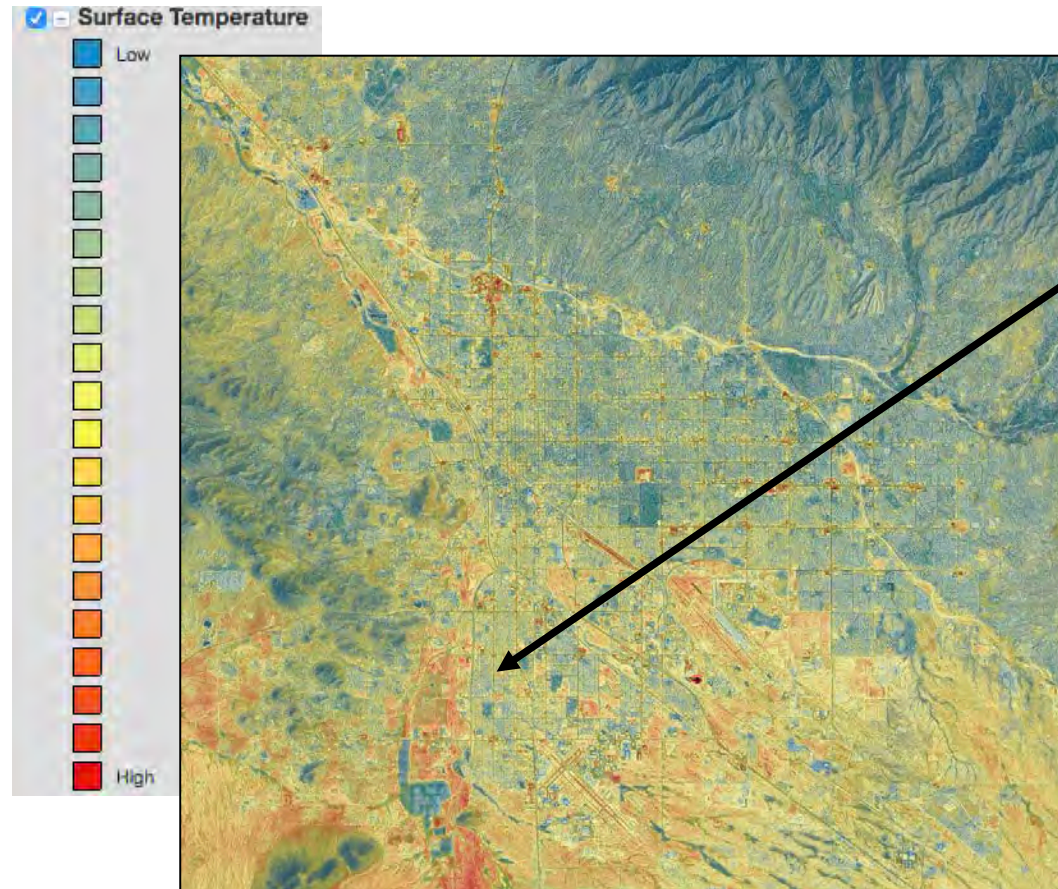
Street in the south side of Tucson



The southern side of Tucson (low income) is mostly deprived of green infrastructure and vegetation

Vulnerabilities

- The south side of Tucson is vulnerable to flood and extreme heat



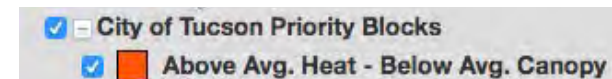
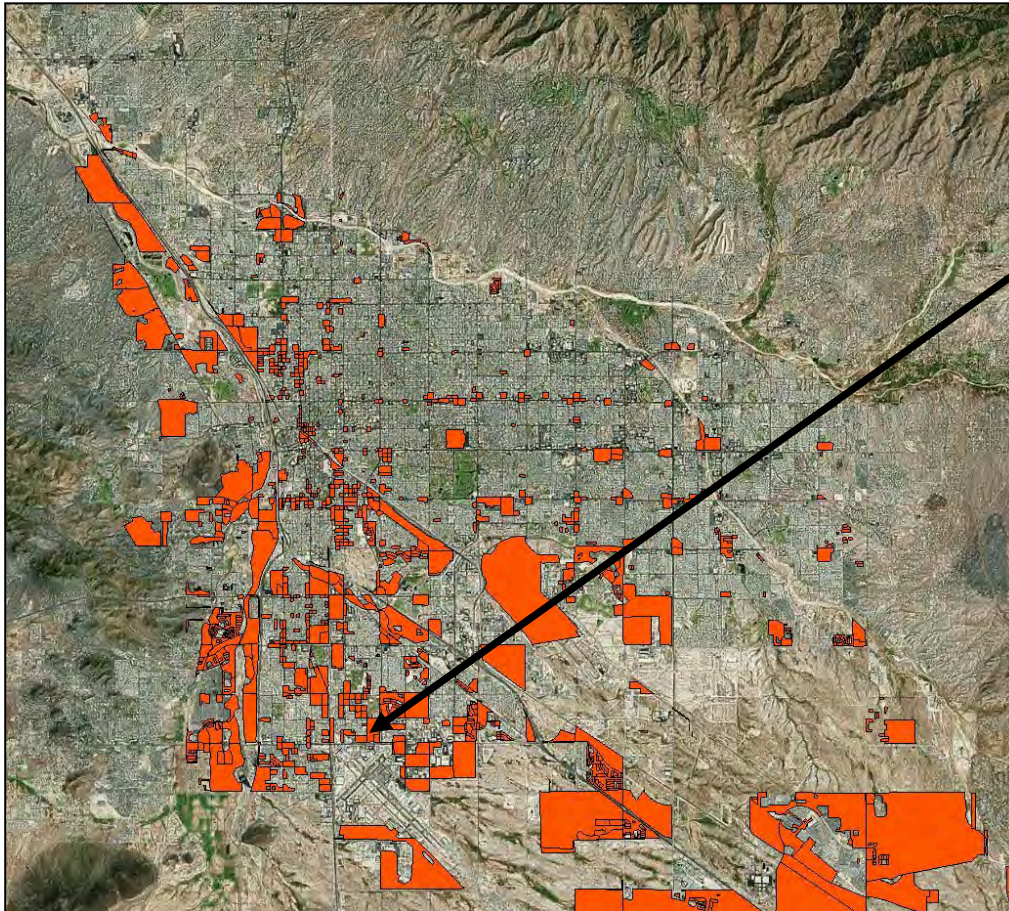
Surface temperature in Tucson, AZ (data from PAG)



Flooding in the south side of Tucson

Vulnerabilities

- Tree campaign priorities focus on areas that have above average heat and below average tree canopy



Priority blocks in Tucson, AZ (data from PAG)

Our project

To address inequities in green infrastructure funding, siting, and implementation

- A collaborative, participatory community engagement project to facilitate the design and adoption of green infrastructure demonstration projects in underserved communities in Tucson



Tucson verde para todos

Engaging communities for an equitable and greener Tucson



Engagement in green infrastructure

- Community engagement is a key factor in the long term benefits of green infrastructure



Roundabout where neighbors worked together to install artwork and vegetation, and maintain it



Roundabout in a neighborhood where neighbors were not engaged

A collaborative, participatory community engagement project

Facilitating engagement at two levels:

- Between organizations working on green infrastructure issues



Meeting with leaders of local organizations



A collaborative, participatory community engagement project

Facilitating engagement at two levels:

- On-the-ground at the neighborhood scale



Collaborating with Star Academy high school

Early lessons learned

(1) Schools are useful bridges between researchers and the community

- Teachers can become "community champions"
- Student as a vehicle for change
- School as a path to the broader community



Early lessons learned

(2) Neighborhood associations play a key role in organizing the community

- Partnering with neighborhood associations is important
- It takes time to build trust



Early lessons learned

(3) For engagement, you cannot bring an agenda

- You cannot tell people what they need -
- even if the science tells you clearly what is needed
- It is important to listen to community needs, and look for the areas of overlap where interests coincide





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Thank you!

